Cooperative Extension Service
College of Tropical Agriculture and Human Resources
University of Hawai'i at Mānoa

Livestock Producer's Nutrient Management Planner Guidebook

A Waste Management Planning Guide for Pacific Island Livestock Producers

Glen K. Fukumoto,[1] Carl I. Evensen,[2] and Luisa F. Castro[2]

[1]Department of Human Nutrition, Food and Animal Sciences, Kona Extension Office; [2]Department of Natural Resources and Environmental Management

Animal Waste Management
AWM-4, February 2008

This guidebook was developed by the Cooperative Extension Service, College of Tropical Agriculture and Human Resources, University of Hawai'i at Mānoa and jointly funded by the USDA Natural Resources Conservation Service's Environmental Quality Incentive Program, Cooperative State Research, Education and Extension Service Section 406; the U.S. Environmental Protection Agency under Section 319(h) of the Clean Water Act; and the Hawai'i Department of Health's Clean Water Branch.

Published by the College of Tropical Agriculture and Human Resources (CTAHR) and issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Andrew G. Hashimoto, Director/Dean, Cooperative Extension Service/CTAHR, University of Hawai'i at Mānoa, Honolulu, Hawai'i 96822.

This Livestock Producer's Nutrient Management Planner provides you, the livestock producer, with help in developing an animal waste management plan for your farm. The plan will be unique to each individual farm due to differences in the types of animals you raise, where your farm is located, and how you manage your operation.

This workbook is designed to provide

- the basics on laws and regulations
- the concept of nutrient flow through your farm
- a series of worksheets to establish the status of your operation
- a guide to developing your farm's nutrient management plan.

Once you are ready to proceed with your plan, you may need additional help. Contact your local United States Department of Agriculture Natural Resources Conservation Service (USDA-NRCS) district conservationist to assist you.

Protecting our water

Clean and abundant water is fundamental to life, supporting natural ecosystems, human health, and economic vitality. Pure fresh water is an essential resource which is often in limited supply in island ecosystems; we need to preserve its quality for human use and to maintain natural ecosystems.

Water resources include our vast coastal waters, surface water sources, and our irreplaceable groundwater. Drinking water on many islands comes from groundwater reserves, which are tapped with deep wells. In other cases, our drinking water comes from streams and surface water catchment systems.

Water is not only essential to life, it is also the medium for the transport of nutrients and pathogens which cause pollution that may harm human health, wildlife, and coastal fisheries. As caretakers and stewards of our islands, it is our responsibility to preserve and improve our limited resources. Controlling these pollution sources is often done in land management areas called watersheds. Watersheds are valleys or drainage basins that are tied together by the water flowing through them.

In ancient Hawai'i, lands were divided into watershed -type units called *ahupua'a*. These land divisions usually extended from the upland forest resources, through the fertile valleys, to the sea, and they included offshore fishing grounds. All resources were preserved and protected to sustain communities for generations. The ahupua'a philosophy prevented pollution, exploitation, and extinction of plants, animals, and ecosystems. It was a model of a successful and sustaining watershed conservation program. Today, we try to learn from the lessons of our ancestors in protecting the environment from potentially polluting activities such as livestock production.

The livestock industries in Pacific Islands are relatively small but provide valuable benefits by producing and supplying nutritious but perishable products of high quality and freshness.

The opportunity for the livestock industries to use the nutrients in manures to increase the production of island crops is obvious. In essence, all of the nutrients generated by the livestock industry can be absorbed by the current marketplace. The prospect for producing a value-added product in the form of composted manure or other composted product is very good. At the same time, proper management, handling, and processing of these manures can reduce the pollution risks of your operation.

Key regulations

There are many regulations that affect livestock producers. These laws are governed by federal as well as local jurisdictions. Also, there are so called "bad actor" laws in which a private citizen can sue a producer for nuisance violations.

Federal regulations

The Federal Water Pollution Control Act (more commonly known as the Clean Water Act), first enacted in 1972, is a wide-sweeping law designed to protect waters of the United States from pollutants. The act differentiates between *point source pollution* (coming from a specific, known source) and *nonpoint source pollution* (coming from various unknown sources). The law prohibits the discharge of pollutants into a water source from a point source unless authorized by a permit from the appropriate agency. (In Hawai'i, this agency is the Department of Health, Clean Water Branch). A concentrated livestock feeding operation that discharges into the nation's waters is considered a point source and must obtain a permit. The nation's waters are considered to be its rivers, streams, lakes, other bodies of surface water, and subsurface water (or groundwater). Most state or local regulatory agencies enforce the Clean Water Act. Under the Clean Water Act, a regulated discharge that occurs without first obtaining a National Pollutant Discharge Elimination System (NPDES) permit subjects the violator to a fine of $25,000 per day. The legislation also allows provisions for citizen suits against point source discharges.

The Coastal Zone Act Reauthorization Amendment (commonly called CZM) was designed to reduce pollut-

ants in coastal waters through nonpoint source pollution control practices. States or local governments that have federally approved coastal zone management programs are required to implement the nonpoint source management regulations. These measures include management of nutrients, pesticides, irrigation water, grazing, and animal manure, as well as erosion and sediment control. All of the land areas in Pacific islands are considered to be within this regulated "coastal zone." At present, this law mainly applies to Hawai'i, American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands, which all have CZM programs.

Local regulations

Many federal regulations must be adopted by local governments in order to be implemented. States, territories, and island governments are free to develop their own regulations, but they must meet minimum federal standards (e.g., local laws may be more stringent but not less stringent than federal laws.) Often, administrative rules are developed to direct the implementation of the laws by local agencies. In Hawai'i, various state agencies have developed a water quality strategy that consolidates local regulations and policies in a document entitled *Hawaii's implementation plan for polluted runoff control*, www.hawaii.gov/health/environmental/water/cleanwater/prc/implan-index.html. County regulations in Hawai'i often take the form of zoning ordinances that dictate land use. However, numerous other specific county ordinances affect livestock operations. Check with your local county planning departments for these ordinances. Examples include land use permits for commercial compost processing, and setback of facilities from major roadways.

Nuisance laws

Private nuisance complaints may be filed against you. Nuisance laws are based on the right of landowners to be free from unreasonable interference with the enjoyment of their property. Nuisance claims against producers often involve situations such as odor problems, flies, dust, noise, rodents, and manure spills resulting from runoff. A nuisance lawsuit may require changes in production practices and payment of damages; non-compliance may force closure of the operation. The primary steps a producer can use to avoid these types of claims are to have good records and use a manure management plan. Many states, including Hawai'i, have enacted "right-to-farm" laws that may offer some protection from nuisance lawsuits. However, right-to-farm laws cannot protect you from pollution violations. Having and following through with a comprehensive nutrient management plan provides you a positive start at reducing your liability from a nuisance lawsuit against your operation. A helpful remedy, in addition to your plan, is to adopt a "good neighbor policy" to improve community relations with nearby property owners.

Your farm plan

Why do we need these plans?

Take a step back in time to the years before the Clean Water Act, and ask yourself, "What was happening to our nation's water resources?" Pollution of streams, rivers, groundwater resources, lakes and the ocean was commonplace by large chemical and manufacturing industries (point sources). No one thought about the fate of these industry by-products until the pollutants made their way through the ecosystem, the food chain, and to people. The industries involved paid for the clean-up, along with major penalties and fines. Self-governance did not work. Since that time, most of these industries have taken responsibility to protect resources, land, and water and better their communities.

Now jump forward to the present time, and ask yourself as a responsible livestock producer, "Am I protecting the land and water resources for the betterment of my community?" In island environments, with our limited land resources, close distances to water (streams, ocean, groundwater) and flash-flooding rainfall events, we need to evaluate and re-evaluate our production systems and use of appropriate technology to minimize nutrient and pathogen risks to the environment. Plans are needed to allow proper planning and compliance with the regulatory requirements. There is no "grandfather clause" that allows an individual to pollute!

Generally there are two basic plans involved in the process of manure management for livestock operations. The first one is called a Conservation Plan, which is the farm's general or overall plan. The second is called the Comprehensive Nutrient Management Plan, which specifically addresses the nutrients on the farm. Approach the planning process in a positive manner to help understand your farm and how to manage it efficiently. Currently the planning process and plans are voluntary.

A complete set of plans

- indicates that the producer has made a consciencious efforts to become a good steward of land and water resources
- can provide an opportunity for financial assistance programs through the USDA-NRCS
- can benefit the farm in cases of complaints made against the farm, to show that proper management measures were approved and in place.

Comprehensive Nutrient Management Plan do-it-yourself guide

In the following pages you will begin to develop your Comprehensive Nutrient Management Plan. This plan will be a site-specific document for your operation. The data and figures that are used should be reflective of your actual farm. Some homework will be required on your part to gather information about your farm.

Site information

Date _____

Farm name _____

Decision-maker _____

Land owner _____

Total farm acreage _____

Tax map key (or other location description) _____

Address _____

E-mail _____

Telephone /fax _____

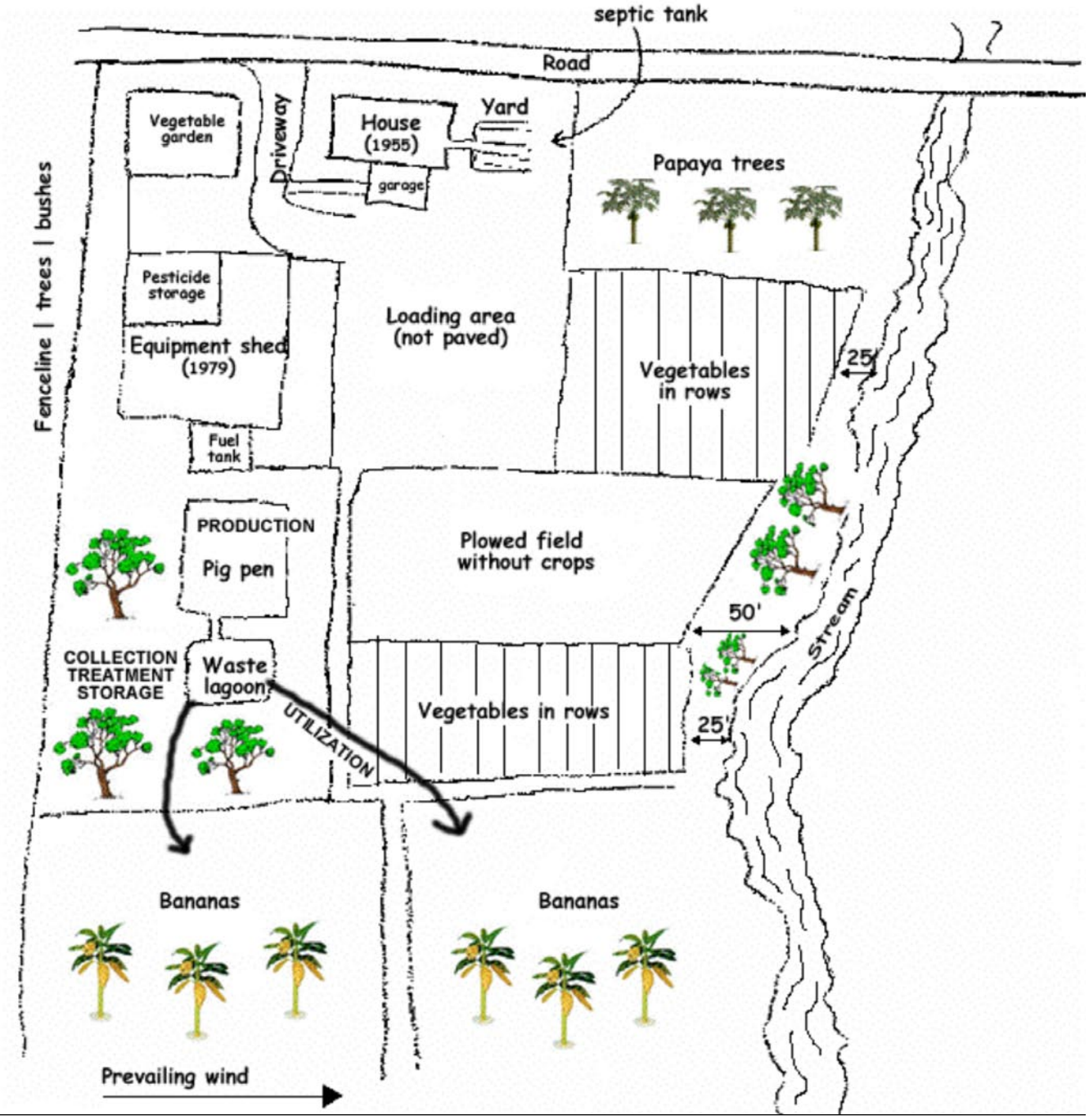
My manure system is designed for the ____ of manure that is produced on my farm.
(Check all that apply: ☐ treatment, ☐ utilization, ☐ disposal)

Farmstead map

Sketch a map of your farm and surrounding areas (roads, streams, neighbors, trees, etc.). Briefly describe buildings and other facilities on the farm (identification, purpose, capacities, year built, cesspool location, etc.).

See the example map below. Be sure to include all the information indicated on the checklist at the bottom of the next page.

Farm map example



Your farm map

Checklist: Identify...

Farm and surrounding areas (roads, landmarks, streams, neighbors, trees, etc.)
Buildings and other facilities (identification, purpose, capacities, cesspool location, etc.)
Drainage areas and waterways
Approximate distance of water resources (streams, wells, mangrove, ocean) from the farm
Segments of your waste management system (production, collection, transfer, treatment, storage, utilization)
Prevailing wind direction

Farm environmental checklist

The following checklist is designed to help you identify potential pollution and other environmental risks and set you on a course for a more sustainable and environmentally sound management system for today and well into the future. Conduct this farm-environment checklist once every two years. All farmers need to accept environmental responsibility by preventing water-related pollution and nuissance in our communities. If you answer "No" to any question, this is an area of environmental concern.

Water quality

Do you know the true source of your drinking water? ☐ Yes ☐ No
Do you know if your farm is located over an aquifer (groundwater)? ☐ Yes ☐ No
Do you know if your farm is located near a well? ☐ Yes ☐ No
Is your farm located at least 50 feet away from a stream or coastline? ☐ Yes ☐ No
Do you inspect your farm and facilities to prevent discharge of manure wastewater? ☐ Yes ☐ No
Are you willing to change management practices to reduce potential environmental risks? ☐ Yes ☐ No

Facility management

Do you keep wash water (wastewater) from your production pens from running over or seeping into the ground? ☐ Yes ☐ No
Do you keep wastewater from running off your property? ☐ Yes ☐ No
Do you have a plan and materials available to control a spill/overflow of wastewater? ☐ Yes ☐ No
Is your pen wash water contained in a leakproof storage tank or other storage facility? ☐ Yes ☐ No
Do you keep rainfall records and monitor rainfall runoff patterns on your farm? ☐ Yes ☐ No
Do you have roof gutters to divert rainwater away from the building and manure storage areas? ☐ Yes ☐ No
Do you control and manage all on-farm wastewater sources (production, storage, utilization)? ☐ Yes ☐ No

Odor and nuissance management

Is wind direction and speed considered before carrying out manure handling activities? ☐ Yes ☐ No
Are vegetation barriers used as a visual buffer and as a filter to dissipate odors? ☐ Yes ☐ No
Do you reduce on-farm odors by frequent pen washing or by covering fresh manure with cured compost or green wastes? ☐ Yes ☐ No
Do you dispose of dead animals properly according to local regulations? ☐ Yes ☐ No
Do you notice very few flies around your farm? ☐ Yes ☐ No
Do you control maggots (fly larvae) where excess feed and manure accumulate? ☐ Yes ☐ No
Have you avoided ever having an official complaint brought against your farm? ☐ Yes ☐ No

Nutrient utilization (if applicable)

Do you know the total amount of nutrients produced on your farm operations? ☐ Yes ☐ No
Do you plan to use the nutrients (manure, compost) that are produced by your farm? ☐ Yes ☐ No
Do you maintain detailed records on manure use, application date, time, and amounts? ☐ Yes ☐ No
Do you regularly sample the soil of fields that receive manure applications? ☐ Yes ☐ No
Do you base your nutrient application rates on realistic yield goals for specific fields and crops? ☐ Yes ☐ No
When applied, do you incorporate manure into the soil, avoiding volatilization loss or odor problems? ☐ Yes ☐ No
Is the manure uniformly applied to your soil to maximize the crop nutrient uptake and to prevent runoff? ☐ Yes ☐ No
Are you or someone else at your farm trained in first-aid techniques? ☐ Yes ☐ No

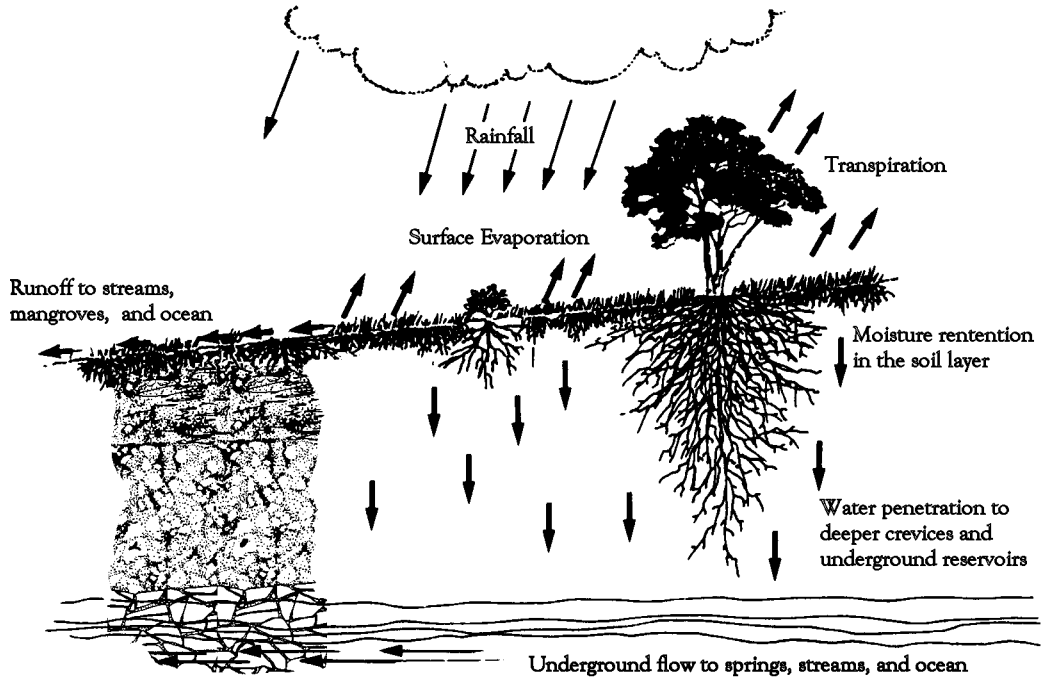
Resource information

Water cycle information

Include the annual rainfall, evaporation, runoff, and recharge rates at your farm's location. The runoff and recharge rates will depend on the soil type. Porous soils generally will have a low runoff rate and a high recharge rate. The data can be acquired from NRCS field offices. The water cycle is an important factor to consider in your livestock waste management system. High rainfall, coupled with high runoff and/or recharge rates, increases pollution risk to the environment.

Annual water cycle information (inches/year)

	Your location	Example: Tinian, CNMI
Rainfall	_____	82
Evaporation	_____	46
Runoff	_____	6
Recharge	_____	30



Nutrient cycle information

Knowing the amount of nutrients produced on your farm can help you to better utilize this valuable resource to improve food crop production and preserve and protect natural resources.

Example: A small village piggery has 3 sows, 1 boar, 1 replacement gilt, 5 nursery pigs, and 10 grower pigs. To calculate the annual nutrients produced on the farm, you will need to estimate the weight of each class of livestock.

Formula: number of animals × average weight (pounds) = total weight (pounds)

Sows	3 × 200 = 600
Boars	1 × 300 = 300
Replacement gilts	1 × 150 = 150
Nursery pigs (< 40 lb)	5 × 25 = 125
Grower pigs	10 × 80 = 800
Total weight	1975

1975 ÷ 1000 = 1.975 livestock equivalents

For each livestock equivalent, multiply by the factor below to find nutrients produced per year

Formula: factor × livestock equivalent = amount per year for the example above

Annual weight, tons	9.1[a] × 1.975 = 18.0 tons
Annual volume, cubic yards	10.8[b] × 1.975 = 21.3 cu yd
Nitrogen (N), pounds	138.7[c] × 1.975 = 274 lb/yr N
Phosphorus (P), pounds	51.1[c] × 1.975 = 101 lb/yr P
Potassium (K), pounds	80.3[c] × 1.975 = 159 lb/yr K

[a] The weight is based on an estimate of 50 pounds manure produced per day per 1000 pounds of livestock:
50 pounds/day × 365 days/year = 18,250 pounds/yr; 18,250 pounds/yr ÷ 2000 pounds/ton = 9.1 tons/yr

[b] The volume is based on an estimate of 0.80 cubic feet per day per 1000 pounds of livestock:
0.8 cu ft/day × 365 days/year = 292 cu ft/yr; 292 cu ft/yr ÷ 27 cu ft/cu yd = 10.8 cu yd/yr

[c] Nutrients are based on the following estimates of pounds per day per 1000 pounds of livestock:
N = 0.38, P = 0.14, K = 0.22. For example, 0.38 lb/day N x 365 = 138.7 lb/yr N

Your nutrient cycle calculation: number of animals × average weight (pounds) = total weight (pounds)

Sows	_____ × _____ =_____
Boars	_____ × _____ =_____
Replacement gilts	_____ × _____ =_____
Nursery pigs, < 40 lb	_____ × _____ =_____
Grower pigs	_____ × _____ =_____
	Total weight = _____
	Total weight ÷ 1000 = livestock equivalent = _____

To find your annual production, substitute your livestock equivalent in the following calculations.

	Factor	Equivalent	Annual amount
Annual weight, tons	9.1	× _____	= _____
Annual volume, cu yd	10.8	× _____	= _____
Nitrogen (N), pounds	138.7	× _____	= _____
Phosphorus (P), pounds	51.1	× _____	= _____
Potassium (K), pounds	80.3	× _____	= _____

Nutrient utilization

Animal manure provides valuable nutrients for use on farms. Before chemical fertilizers became widely available, manure provided the main source of nutrients for improving soil fertility. As with any nutrient source, you need to apply just the right amount of manure to make efficient use; if too much is applied, the excess is lost to the environment, causing pollution.

To make efficient use of both chemical (inorganic) and organic fertilizers (including animal manures), the farmer must know the nutrient requirements of the crop to be grown and the amount of nutrients already available from the soil. The best way to determine this is to take a soil sample and have it tested for nutrient availability. See *Testing your soil—why and how to take a soil-test sample*, which explains soil sampling and can be downloaded from the UH-CTAHR website: www.ctahr.hawaii.edu/oc/freepubs/pdf/SCM-9.pdf. This will form the basis of your nutrient management plan. It is also a good idea to get the manure tested for nutrient content, because manures vary depending on the type of animal, their age, and their diet. When soil and manure samples are submitted for analysis at a testing laboratory, you should also request that a recommendation be given for manure application rates.

Laboratory analysis indicates the nutrient and moisture content of the manure, which allows accurate calculation of application rates for crops. Samples should represent the average composition of the material to be applied to the field (i.e., the sample should be "representative"). So that the composited materials consist of reliable samples, be sure to collect from a number of different locations.

The essential analyses for manures and effluents include concentrations of essential plant nutrients, including nitrogen (N) as ammonium (NH_4), nitrate (NO_3), and organic N; phosphorus (P); calcium (Ca); magnesium (Mg); sulfur (S); iron (Fe); manganese (Mn); zinc (Zn); copper (Cu); boron (B); dry matter content; pH; and electrical conductivity (EC) (for liquid samples).

Sample collection: Effluent

1. Label the sample bottle with identification information. Use a permanent marker (e.g., a Sharpie® marking pen), include the date, and identify sample with a number or letter. Keep a record of the sample in a notebook.
2. Fill the bottle two-thirds full with effluent, and secure the lid.
3. Place the bottle inside a plastic bag and seal the bag. Do not place any information sheet or payment inside the plastic bag.

Sample collection: Solids (manure or compost)

1. Label a plastic bag with sample identification, as described above.
2. Sample the manure or compost from a pen or storage area. Using a bucket or other suitable container, take three or four equal sub-samples, and mix them well.
3. Put 1 pint of sample into the plastic bag and seal it.

The Agricultural Diagnostic Service Center (ADSC) of the College of Tropical Agriculture and Human Resources at the University of Hawai'i at Mānoa provides residents of Hawai'i with a reasonably priced soil and plant-tissue testing service. Samples for analysis by ADSC can be taken to county offices of the CTAHR Cooperative Extension Service, or they can be delivered or mailed directly to ADSC at 1910 East-West Road, Room 134, Honolulu, HI 96822.

The Western Pacific Tropical Research Center at the University of Guam offerd analytical services to the Guam community and the Micronesian region. For soil and plant-tissue testing services, send samples for analysis to Soil Labs, College of Natural and Applied Sciences, University of Guam, Mangilao, Guam 96923, 671-735-2134, e-mail soillabs@uog.uog9.edu.

Suggested management practices for small farms

In the majority of Pacific islands, piggery operations are small, numerous, and spread across the landscape. In these small communities and villages, pigs play an integral part in the culture and traditions of the people. Most piggeries are non-commercial operations, with limited fiscal resources and limited land areas, bounded by the sea. Waste management systems or models designed for large commercial operations simply do not work in these small piggeries.

The seven concepts on the following pages are suggested management practices for small farms. No system is perfect, and there are no "free" systems without costs or labor inputs. Some of these concepts are new, and others are as old as the history of farming. If you have new ideas, share them with your community. Considering these ideas and other information presented in this manual, how do *you* plan to use your animals' manure?

Composting

Solid waste is combined with carbon material such as tree trimmings, coconut husks, palm fronds, and other organic materials. The heat from composting kills weed seeds, pathogens, and insect larvae. For more information on composting, download *Composted animal manures: precautions and processing* and *Composted swine manure for vegetable crop application* from www.ctahr.hawaii.edu/freepubs under the heading Animal Waste Management.

This farmer in American Samoa uses a series of covered wire composting units to regulate moisture levels in a high-rainfall climate.

Advantages

- The end-product provides a valuable soil amendment to improve soil quality
- Nutrients in waste solids are utilized
- Potential for nutrient pollution is controlled
- Flies and odors are reduced

Disadvantages

- Requires a commitment of space and labor
- Requires a consistent supply of carbon material
- Requires a solids separator or manual solids collection

Portable pen

The portable dry-litter pen system is an excellent and practical option for small-scale sustainable piggery operations. It integrates the concepts of the dry-litter waste management system, rotational grazing, and composting. For more information on the pen, download *A portable dry-litter pig pen* from www.ctahr.hawaii.edu/freepubs under the heading Animal Waste Management.

This portable dry-litter pen is set up around a tree for additional shade.

Advantages

- Eliminates water used in pen washdown
- Eliminates discharge of effluent from the pen
- Lowers management to operate
- Provides organic fertilizer by-product
- Requires only a small "footprint" (land area)

Disadvantages

- Requires a consistent supply of carbon
- Only applicable for small scale operations
- Requires rotation/relocation every 4–5 months
- Requires smooth ground, cannot be used on steep or rough terrain
- Should not be used over critical water groundwater recharge areas

Pohnpei drip irrigation system

The system is a way of directly applying effluent water to crop land. The simple gravity-flow system takes nutrients from the up-gradient piggery to the down-gradient crop land.

Advantages

- Excellent management option for liquid material
- Low cost and easy to install
- Low level of management to operate and easy to maintain
- Nutrients in the effluent provide an organic fertilizer to enhance crop production

Disadvantages

- Requires a solid separator to sort the solids and pig hair from the liquid material so drip system can work properly
- Requires time and labor to unplug the drip holes
- Requires caution when applying to crops because the effluent contains pathogens

Rain gutters are used in this low-cost irrigation system, which distributes pen washdown water to target cropping area.

Modified dry-litter systems

Carbon-rich materials, such as nut shells, wood chips, or other organic material, are used as bedding for swine. Litter material moves across the sloped floor from the pig activity and deposits into a collection area located below the pen. For more information on this system, download *Dry litter waste management system* from www2.ctahr.hawaii.edu/adap2/Publications/ADAP_pubs.htm under Swine Waste Management for Pacific Islands

Advantages

- No water used in pen washdown
- No discharge of effluent from the pen
- Low to moderate level of management to operate
- Organic fertilizer by-product for crop use or sold as compost at favorable returns

Disadvantages

- Consistent supply of carbon required, adding effort in acquisition, transportation, and storage
- Cannot be adapted to existing piggeries with flat floors
- Composting of resultant litter will require additional management

Sows appear comfortable on a bed of carbon materials (wood chips and coconut husks) on the island of Tinian.

Grazing cage

Chickens are raised in bottomless pens that can be moved one pen-length every day. This way the pathogens and manure never build up, and the birds have fresh grass (forage) every day.

This grazing poultry cage is being used for laying hens. The open bottom allows the animals to graze on available forage (perennial peanut shown here) and insects.

Advantages

- Distributes manure in a controlled area
- Recycles nutrients to plants
- Adjusts to 150 square feet
- Low-cost and easy to operate
- Can be used for layers and broilers
- Saves feed costs
- Controls weeds
- Produces nutritious, forage-based eggs or meat
- Helps manage pests, because birds are scratching for insects

Disadvantages

- Dry-season forage growth reduced, slows down rotation to allow longer rest periods.
- Pen must be rotated, depending on the number of animals; more animals = faster rotation

Direct manure application

Swine waste solids can be applied safely around the base of large plants, such as banana and breadfruit, or around crops such as sweetpotato which will be cooked. Avoid direct contact of the wastes with food plants (such as lettuce or cucumber) that could be consumed raw. For more information on using manure, download *Treatment, storage and use of swine waste solids* from www2.ctahr.hawaii.edu/adap2/Publications/ADAP_pubs.htm under Swine Waste Management for Pacific Islands.

Direct application to appropriate crops is a simple way to use manure.

Advantages

- Simple
- Good fertilizer for tree crops

Disadvantages

- Requires collection of solids by scraping or solid separator; or collection and distribution of effluent by additional equipment
- Should not be used for leafy vegetable or root crops
- Use precautions when handling manure
- May produce offensive odors during and after application

Solids separator

The role of the separator is to keep solids out of the effluent lagoon pond that is built below it. The purpose of the lagoon is to treat the effluent and to allow for evaporation of the liquid.

A solids separator allows for easier collection of manure solids by removing the liquid component.

Advantages

- Allows efficient collection of the nutrients contained in the manure
- Increases the capacity of the storage facility
- Provide good fertilizer value for direct application to crops or for further composting

Disadvantages

- Separator is a component of a waste management system, not a complete system
- Must remove solids from the unit for the entire system to operate effectively
- Involves more labor and generally a higher cost, because the separator is usually built in tandem with and situated above the effluent lagoon pond
- Requires additional management of the manure (storage, composting) prior to use

Summary

Using the nutrients from animal manure is good business and good for the environment. Proper manure management can go a long way in improving water and soil quality. Manure that isn't retained or used has the potential to reach a water body. A well designed nutrient management system provides more opportunities to properly apply and use the manure, reduces odor and pests, reduces the pollution risks of your operation, keeps you in compliance with government regulations, and limits your operation's liability. The seven examples of nutrient management systems described in this document are suggested practices for small-scale farms. There may be other options available that will work better for you but are not mentioned here. Please feel free to plan, design, and build a system that works for you and will help you in better managing your farm's livestock manure.